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LABOR PRODUCTIVITY IN FOOD MANUFACTURING

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Labor productivity--output per man-hour--in factories processing farm-originated foods increased 85 percent from 1947 to 1967, according to recent estimates (table 9). 1/ In other words, only 54 percent as many man-hours were required per unit of output in 1967 as in 1947. Except for a small decline in 1948 and no change in 1951, output per man-hour has increased every year since 1947.

Output of factories processing farm foods increased 71 percent from 1947 to 1967 (preliminary estimate). 2/ Except for a small decrease in 1948 and no change in 1957, factory output increased in every year.

The larger increase in output per man-hour than in total output resulted in in a decline (8 percent) in total man-hours worked in food manufacturing during 1947-67. All industries except processed fruits and vegetables had a decline in number of man-hours.

During 1947-67, output per man-hour in food manufacturing increased at an average annual rate of 3.5 percent, with gains in all food-manufacturing industries (table 10). The sugar industry had the largest average increase (4.9 percent). Other industries having above-average increases were dairy products, grain mill products, meat products, and processed fruits and vegetables. Bakery products had the smallest increase (2.2 percent).

Comparison of 1947-56 to 1957-67

Labor productivity in food manufacturing increased at a faster rate in the past decade than during the previous decade. During 1957-67, output per man-hour rose by 3.8 percent per year, compared with 2.7 percent during 1947-56. During 1957-67, all industries, except processed fruits and vegetables and sugar products, had larger rates of increase in output per man-hour than during 1947-56.

Increases in labor productivity in the grain mill and bakery industries during 1957-67 were almost triple the rates during 1947-56. The confectionery industry almost doubled its rate of growth in labor productivity. Smaller, but significant, gains also occurred in the meat and dairy-manufacturing industries between 1947-56 and 1957-67.

The processed-fruits-and-vegetables industry had the largest annual increase in factory output in both periods, 5.0 percent during 1947-56, and 4.6 percent in 1957-67. The sugar-products industry also had an annual increase of 4.6 percent in 1957-67.

Dairy-products industry had comparatively large annual decreases in the number of man-hours---2.6 percent during 1947-56, and 2.5 percent during 1956-67.

Comparison With Other Sectors

The average annual rate of growth in output per man-hour in 1957-67 was higher for food-manufacturing industries than for all manufacturing industries and for the entire private sector of the economy.

1/ Data in this article are regularly computed by the Economic Research Service. A comprehensive report, including a discussion of methods, sources and limitations of the data, was published in Output per Man-Hour in Factory Processing of Farm-Food Products, by William H. Waldorf, Tech. Bull. 1243, ERS, U.S. Dept. of Agr., Washington, D.C., May 1961 (out of print). Data are for manufacturing establishments primarily engaged in processing domestically produced farm foods except fluid milk, cream, and eggs which were excluded because of incomplete data. Factory processing of imported foods, sea-foods, and other foods not originating on domestic farms and manufacture of alcoholic and nonalcoholic beverages also were excluded.

2/ The output index (table 9) measures the approximate value added by manufacturing in constant dollars (net physical output).

Table 9.--Output per man-hour, output, and total man-hours in manufacturing farm-originated foods, by industry, 1947-67 1/

(1957-59=100)

Year	All foods 2/			Meat products 3/			Manufactured dairy products 4/			Processed fruits and vegetables 5/		
	Output	Man-hours	Output per man-hour 6/	Output	Man-hours	Output per man-hour 6/	Output	Man-hours	Output per man-hour 6/	Output	Man-hours	Output per man-hour 6/
1947	78	104	75	81	106	77	92	139	66	64	101	64
1948	76	102	74	74	101	73	85	129	66	66	97	68
1949	77	101	77	76	104	73	84	116	72	69	94	73
1950	80	102	78	78	104	75	83	123	67	70	95	74
1951	81	104	78	77	107	72	79	115	69	82	104	79
1952	84	106	79	81	109	74	79	113	70	81	100	81
1953	86	7/100	7/86	87	7/106	7/82	83	7/116	7/72	85	7/96	7/89
1954	87	99	88	89	105	85	83	106	78	85	94	90
1955	90	101	90	97	107	91	87	108	81	90	95	95
1956	97	103	93	103	111	93	93	107	87	102	99	103
1957	97	101	95	101	105	96	97	106	92	97	100	97
1958	99	8/99	8/100	97	8/98	8/99	100	8/97	8/103	98	8/99	8/98
1959	104	100	104	102	98	105	103	97	106	105	101	104
1960	107	100	107	107	97	111	106	100	105	112	103	109
1961	111	99	112	108	93	116	111	98	113	121	104	116
1962	116	98	118	110	92	120	114	92	123	130	104	125
1963	118	95	125	116	91	128	115	85	135	126	102	123
1964	124	97	128	124	97	129	120	84	142	134	104	129
1965	125	96	130	121	90	134	120	82	146	137	108	128
1966	129	96	134	126	88	143	117	84	140	145	111	131
1967	133	96	139	132	90	147	120	83	144	150	108	139

Data for 1964-67 are preliminary.

1/ Man-hour indexes for all employees and hours worked; figures for 1948 and 1967 interpolated from Bureau of Labor Statistics data on all employees and hours paid for. 2/ Includes poultry-dressing plants and establishments primarily engaged in manufacturing shortening and cooking oils, margarine, macaroni, and spaghetti, as well as industry groups shown in this table. The series includes food manufacturing in Alaska and Hawaii since 1958. 3/ Includes meat-packing plants and establishments specializing in prepared meat products. 4/ Includes establishments primarily engaged in manufacturing creamery butter, natural cheese, concentrated milk, ice cream and ices, and special dairy products; excludes processing of fluid milk and cream. 5/ Includes establishments primarily engaged in canning fruits and vegetables, dehydrating fruits and vegetables, freezing fruits and vegetables, and manufacturing pickles and sauces. 6/ Computed from unrounded figures. 7/ Census Bureau revised sampling plan and universe in annual survey of manufacturers beginning in 1953. Thus, data for 1953 and later years are not strictly comparable with those for earlier years. 8/ Data for all industry groups cover Alaska and Hawaii starting with 1958. Post 1958 years have been made comparable with earlier years.

Continued--

Table 9.--Output per man-hour, output, and total man-hours in manufacturing farm-originated foods, by industry, 1947-67 1/--Continued

(1957-59=100)

Year	Grain-mill products 9/			Bakery products 10/			Sugar 11/			Confectionery 12/		
	Output	Man-hours	Output per man-hour 6/	Output	Man-hours	Output per man-hour 6/	Output	Man-hours	Output per man-hour 6/	Output	Man-hours	Output per man-hour 6/
1947	94	123	77	85	97	88	82	137	60	88	118	75
1948	89	117	76	86	101	86	68	118	58	90	122	74
1949	83	111	75	88	100	88	75	111	68	87	118	74
1950	84	111	75	90	100	89	92	124	74	93	125	75
1951	86	113	76	92	104	89	69	116	59	89	105	85
1952	86	122	71	96	106	90	72	113	64	90	110	82
1953	87	7/112	7/77	92	7/96	7/95	82	7/122	7/68	90	7/104	7/87
1954	87	102	85	91	97	94	89	104	86	86	101	85
1955	88	106	83	92	98	94	80	97	82	85	103	83
1956	92	104	88	95	100	95	87	95	92	90	105	85
1957	95	101	95	96	100	96	94	98	96	96	101	95
1958	100	8/99	8/101	101	8/100	8/101	98	8/101	8/97	100	8/100	8/100
1959	105	101	104	103	101	102	108	101	107	104	99	105
1960	109	101	108	104	101	103	110	99	111	107	99	108
1961	114	100	114	105	99	106	118	102	115	110	100	110
1962	119	99	120	108	98	110	123	98	126	111	101	110
1963	125	93	135	110	92	120	145	107	135	116	96	122
1964	129	94	137	114	92	123	151	116	131	121	98	123
1965	129	93	139	115	91	127	140	108	130	124	98	126
1966	131	92	143	115	90	128	143	105	136	131	99	132
1967	131	92	142	122	92	132	140	99	142	134	95	140

Data for 1964-67 are preliminary.
2/ Includes establishments primarily engaged in manufacturing flour and meal, cereal products, rice milling, blended and prepared flour, and corn wet milling products. 10/ Includes establishments primarily engaged in manufacturing biscuits and crackers, whole-sale bakeries, grocery chain bakeries, home-service bakeries, and retail multi-outlet bakeries (excluding nonbaking outlets except those retail units at the same location as the bakery). In 1954, establishments which were part of a chain and were producing for direct sale on premises were reclassified from the Census of Manufacturers to the Census of Retail Trade; however, this did not significantly affect comparability of series between 1947 and 1954. Establishments which bake primarily for direct sale to con-sumers are not included. 11/ Includes establishments primarily engaged in manufacturing raw cane sugar from domestically grown cane and plants mainly engaged in the production of beet sugar. 12/ Includes establishments primarily engaged in manufacturing candy and other confections.

Table 10.--Average annual change in output per man-hour, output, and total man-hours in manufacturing farm-originated foods, by industry, 1947-67 1/

Industry group	1947-67			1947-56			1957-67		
	Output	Man-hours	Output per man-hour	Output	Man-hours	Output per man-hour	Output	Man-hours	Output per man-hour
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
All farm foods	3.0	-.4	3.5	2.5	-.2	2.7	3.3	-.6	3.8
Meat products	2.9	-1.0	4.0	3.4	.6	2.7	3.0	-1.3	4.4
Dairy products	2.3	-2.3	4.8	.2	-2.6	2.9	2.2	-2.5	4.8
Processed fruits and vegetables	4.4	.6	3.7	5.0	-.2	5.2	4.6	1.0	3.6
Grain mill products	2.6	-1.4	4.1	2/	-1.5	1.6	3.4	-1.1	4.5
Bakery products	1.7	-.5	2.2	1.0	-.1	1.2	2.1	-1.2	3.4
Sugar products	4.1	-1.0	4.9	1.3	-3.0	4.6	4.6	.7	4.0
Confectionery products	2.3	-1.1	3.4	-.2	-2.1	1.9	3.3	-.4	3.7

1/ Based on table 9.
2/ Less than 0.1 percent increase.

In contrast, during 1947-56, the annual rate of growth was lower for food manufacturing than for all manufacturing and for the private sector. Annual rates of growth in labor productivity in the private sector of the economy are shown below: 3/

	1947-67	1947-56	1957-67
	- - - - - Percent - - - - -		
Total	3.2	3.6	3.3
Nonfarm	2.7	2.9	2.9
Manufacturing:			
All	2.9	3.1	3.5
Farm-food ..	3.5	2.7	3.8

Factors Affecting Output Per Man-Hour

Several factors have contributed to the postwar rise in labor productivity. Improvements in technology have probably been the most outstanding factors. Many technological innovations have been adopted, such as cattle-on-the-rail dressing system, continuous processes, automation, and conveyorization. Development of new products utilizing new technologies may also have helped raise output per man-hour. The adoption of technological improvements has resulted in a substitution of capital for labor, and involved an increase in expenditures for plant and equipment.

Expenditures for new plant and equipment by all firms manufacturing food and beverages averaged $1.35 billion during 1965-67, up 78 percent from 1954-56. 4/ Expenditures were relatively stable throughout the 1950's, increased slowly in the early 1960's, and accelerated in the mid-1960's.

Expenditures by the food-and-kindred-products industry on research and

3/ Average annual rates of growth in output per man-hour worked in the private sector were computed from annual estimates by the Bureau of Labor Statistics reported in Handbook of Labor Statistics, 1968. All average annual rates of change were obtained by fitting exponential curves by least squares (Glover's method) to annual data.
4/ Office of Business Economics, 1967 Business Statistics, Washington, D.C., 1968, p. 9.

development amounted to $166 million in 1966, an increase of 159 percent over 1956. 5/ The food-and-kindred-products industry also benefited from expenditures for research and development by the chemical industry, food machinery industry, electrical industry, universities and Government agencies.

Along with the technological changes, an improvement in the quality of management and labor has also contributed to higher labor productivity. This has resulted from increased emphasis on education and on-the-job training.

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5/ Estimates from National Science Foundation.